



U.S. Department of  
Transportation



## Intelligent Transportation Systems Standards Fact Sheet

### NTCIP 1101

August 2002

## National Transportation Communications for ITS Protocol (NTCIP) - Simple Transportation Management Framework

Originally published as NEMA TS 3.2-1996

### Overview

The National Transportation Communications for Intelligent Transportation System (ITS) Protocol (NTCIP) is a family of standards that provides both the rules for communicating (called protocols) and the vocabulary (called objects) necessary to allow electronic traffic control equipment from different manufacturers to operate with each other as a system. The NTCIP is the first set of standards for the transportation industry that allows traffic control systems to be built using a "mix and match" approach with equipment from different manufacturers. Therefore, NTCIP standards reduce the need for reliance on specific equipment vendors and customized one-of-a-kind software. To assure both manufacturer and user community support, NTCIP is a joint product of the National Electronics Manufacturers Association (NEMA), the American Association of State Highway and Transportation Officials (AASHTO), and the Institute of Transportation Engineers (ITE).

The NTCIP family of standards is a joint project of the following standards development organizations:

**American Association of State Highway and  
Transportation Officials (AASHTO)**

**Institute of Transportation Engineers (ITE)**

**National Electrical Manufacturers Association  
(NEMA)**

(Contact information is shown at the end of this fact  
sheet)

To obtain a copy of this standard, please contact:  
**Global Engineering Documents**  
Web site: <http://global.ihs.com>

Publication Date: December 1996  
Amendment 1 Date: December 1998

### What is this standard for?

This standard, **NTCIP 1101, NTCIP - Simple Transportation Management Framework (STMF) plus its Amendment from 1998 (Amendment 1)**, specifies a set of rules for processing, organizing and exchanging information between transportation centers (management applications) and transportation equipment (traffic signal controllers, message signs, etc.) so they can communicate with each other. The STMF integrates the Internet-standard Simple Network Management Protocol (SNMP) and its derivative Simple Transportation Management Protocol (STMP), which has been designed to be compatible with SNMP. STMP is a newly developed base standard designed to address limited bandwidth communications links that requires SNMP for its configuration. In the annexes of this standard, there are sets of definitions that specify the setup of the data as well as the parameters needed to enable the bandwidth-saving STMP.

STMF does not address lower layer communications protocols such as TCP/UDP/IP or PPP. The specification for these protocols can be found in either "base protocols" that explain their setup or in "profiles" that assemble different base protocols into a "communications stack" that addresses the existing or desired communications infrastructure. SNMP has been designed to and should be used in conjunction with UDP/IP, while STMP may be used over either UDP/IP or with a null transport profile.

### Who uses it?

This standard, **NTCIP 1101, NTCIP - Simple Transportation Management Framework (STMF)**, is intended for traffic engineers and communications engineers involved in the specification, selection, procurement, installation, operation, and maintenance of electronic traffic control communications equipment between central controllers and sensors, traffic signal controllers, dynamic message signs, etc. Additionally, this standard is of interest to computer application (software) developers responsible for the exchange of information among electronic traffic control devices.

Additionally, Annex A of the application profile for STMF (**NTCIP 2301, AP-STMF**) may prove useful to users of this standard since it organizes the requirements of STMF into a list of specific capabilities and options within the profile. The list can be used by:

- A user of an implementation, as a basis for checking the compatibility with other implementations;
- A protocol implementor, as a checklist to reduce the risk of failure to conform to all requirements;
- A supplier or acquirer, as a detailed indication of the capabilities of an implementation;
- A protocol tester, as the basis for selecting appropriate tests to ensure conformance of an implementation.

## How is it used?

This standard, **NTCIP 1101, NTCIP - Simple Transportation Management Framework (STMF)**, provides the data description, data encoding and data processing communications rules which may be used to enable transmission of information between computers/electronic processors/controllers and electronic microprocessor-controlled traffic related devices. There are several options included within this standard for each of which an implementor will have to decide if it is needed for a particular implementation. For example, an implementor needs to decide whether bandwidth limitations require the use of the optional STMP.

This standard does not address the data processing and encoding requirements for the underlying physical infrastructure nor does it detail whether information can be routed. However, the protocols specified within the STMF should include connectionless transport layer protocols such as UDP/IP if data packets are to be routed within a networked communications environment.

The requirements of the STMF and its Amendment must be combined with other standards that address the physical communications architecture requirements (e.g., if the communication is over an Ethernet LAN or a multidrop direct connect using twisted pair), as well as the information requirements related to a specific application or device. In the case of communicating with a traffic signal controller in a routable (e.g., the communications is going through a communications hub) direct connect physical environment, the STMF would be combined with a combination of transport and network layer protocols such as UDP/IP (combined in a transport profile) and a combination of "direct-connect"-addressing data link and physical layer protocols such as PMPP and RS-232-E (combined in a subnetwork profile) to define how information is to be transferred. Additionally, the end-application (traffic signal controller) would have to be addressed requiring the specification of standards NTCIP 1201, Global Object Definitions and NTCIP 1202, Object Definitions for Actuated Signal Controller Units, to define what information is transferred.

## Scope

**NTCIP 1101, NTCIP - Simple Transportation Management Framework (STMF)**, provides part of a common method to manage, control and monitor field devices such as traffic signal controllers, dynamic message signs and highway advisory radio stations using parameters and variables that are defined in a common, computer-ready readable format. The main and mandatory protocol used to communicate the values of these parameters as well as their encoding rules are based on the existing and widely installed Internet protocol, SNMP with its associated basic encoding rules (BER).

Legacy systems with very limited bandwidth availability can be addressed using the newly developed protocol, STMP, with a more efficient set of encoding rules, termed octet encoding rules (OER). In order to execute, STMP, a set of control parameters were developed that are described in the Structure of Management Information (SMI, see Annex A) and the Transportation Management Information Base (TMIB, see Annex B). These set of definitions define the setup of the data as well as the parameters needed to enable the bandwidth-saving STMP protocol.

There are five major components of the standard:

- Simple Network Management Protocol, Version 1 (made mandatory in Amendment 1);
- Simple Transportation Management Protocol (made optional in Amendment 1);
- Octet Encoding Rules (OER) (definition clarified in Amendment 1);
- Structure and Identification of Management Information (SMI) in Annex A (with modifications defined in Amendment 1);
- Transportation Management Information Database (TMID) in Annex B (object definitions modified in Amendment 1).

## Related documents

To accommodate the broad scope of this standardization effort, the NTCIP standard has been divided into numerous individual standards. A detailed list of related documents is available on the **NTCIP 9001 – NTCIP Guide** fact sheet. (The NTCIP Guide is also available on-line at [www.ntcip.org](http://www.ntcip.org)).

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